ANALYTICAL REPORT

Prepared by
Lockheed Martin Information Systems and Global Services/Environmental Services
Scientific, Engineering, Response and Analytical Services

MCHM Ohio River

January 2014

EPA Work Assignment No. SERAS-001
LOCKHEED MARTIN Work Order SER47001
EPA Contract No. EP-W-09-031

Submitted to
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EPA-ERT
2890 Woodbridge Avenue
Edison NJ 08837

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QA/QC Officer

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Analysis by:
ERT/SERAS

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Appendix A will be furnished on request.

Environmental Response Team/Scientific Engineering, Response and Analytical Services
2890 Woodbridge Avenue, Building 209 Annex
Edison NJ 08837

TESTING LABORATORIES INFORMATION

Analysis of 4-Methlycyclohexane Methanol in Water by SERAS SOP# 1857, "*Extraction and Analysis of 4-Methylcyclohexane Methanol in Water by Gas Chromatography/Mass Spectrometry (GC/MS) by Selective Ion Monitoring (SIM)*"

ERT/SERAS Laboratory
2890 Woodbridge Avenue
Edison, NJ 08837

All analyses were performed according to our NELAP-approved quality assurance program. The test results meet the requirements of the current NELAP standards, where applicable, except as noted in the laboratory case narrative provided. Results are intended to be considered in their entirety and apply only to those analyzed and reported herein. The ERT/SERAS Laboratory is certified for the analysis of semivolatile organic compounds in water; however, 4-methylcyclohexane methanol is not an accredited compound.

Detailed Sample Information

SERAS Sample #	Field Sample #
R401006-01	Site 1 Vertical 1
R401006-02	Site 1 Vertical 2
R401006-03	Site 1 Vertical 3
R401006-04	Site 2 Vertical 1
R401006-05	Site 2 Vertical 2
R401006-06	Site 2 Vertical 3
R401006-07	Site 3 Vertical 1
R401006-08	Site 3 Vertical 2
R401006-09	Site 3 Vertical 3
R401006-10	Site 4 Vertical 1
R401006-11	Site 4 Vertical 2
R401006-12	Site 4 Vertical 3

Introduction

SERAS personnel, in response to WA# SERAS-001, provided analytical support for environmental samples collected from the MCHM Ohio River Site, as described in the following table. The support also included QA/QC, data review and preparation of an analytical report containing analytical and QA/QC results.

The samples analyzed at SERAS were treated with procedures consistent with those specified in SERAS SOP #1008, *Sample Receiving, Handling and Storage* and SERAS SOP# 1009, *Operation of Sample Refrigeration Units.*

Chain of Custody #	Number of Samples	Sampling Date	Date Received	Date Analyzed	Matrix	Analysis/ Method	Laboratory	Data Package
06801	12	01/17/14	01/18/14	01/19/14 & 01/20/14	Water	MCHM/ SERAS SOP# 1857	ERT/SERAS	Z 003

Case Narrative

Sampling was conducted as per the site-specific Quality Assurance Project Plan (QAPP) and analyzed by the analytical methods as stated in the QAPP. The laboratory reported the data to two significant figures. Any other representation of the data is the responsibility of the user. Data were validated using a Stage 4 validation done manually (S4VM) in accordance with the "Guidance for Labeling Externally Validated Data for Superfund Use." All data validation flags have been inserted into the results tables.

MCHM in Water Package Z 003

The data package was examined and found to be acceptable.

Summary of Abbreviations

BFB	Bromofluorobenzene
C	Centigrade
CLP	Contract Laboratory Program
COC	Chain of Custody
conc	concentration
cont	continued
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
D	(Surrogate Table) value is from a diluted sample and was not calculated
Dioxin	Polychlorinated dibenzo-p-dioxins (PCDD) and Polychlorinated dibenzofurans (PCDF)
DFTPP	Decafluorotriphenylphosphine
EMPC	Estimated maximum possible concentration
GC/MS	Gas Chromatography/ Mass Spectrometry
IS	Internal Standard
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MDA	Minimum Detectable Activity
MS (BS)	Matrix Spike (Blank Spike)
MSD (BSD)	Matrix Spike Duplicate (Blank Spike Duplicate)
MW	Molecular Weight
NA	Not Applicable or Not Available
NAD	Normalized Absolute Difference
NC	Not Calculated
NR	Not Requested/Not Reported
NS	Not Spiked
% D	Percent Difference
% REC	Percent Recovery
SOP	Standard Operating Procedure
ppbv	parts per billion by volume
ppm	parts per million
pptv	parts per trillion by volume
PQL	Practical Quantitation Limit
PAL	Performance Acceptance Limit
QA/QC	Quality Assurance/Quality Control
QL	Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SERAS	Scientific, Engineering, Response and Analytical Services
SIM	Selected Ion Monitoring
Sur	Surrogate
TIC	Tentatively Identified Compound
TCLP	Toxicity Characteristic Leaching Procedure
VOC	Volatile Organic Compound
*	Value exceeds the acceptable QC limits

m^3	cubic meter	g	gram	kg	kilogram	L	liter
µg	microgram	µL	microliter	mg	milligram	mL	milliliter
ng	nanogram	pg	picogram	pCi	picocurie	s	sigma

Data Validation Flags

J	Value is estimated	R	Value is unusable
J+	Value is estimated high (metals only)	U	Not detected
J-	Value is estimated low (metals only)	UJ	Not detected and RL is estimated
N	Presumptively present (Aroclors only)		

Rev. 1/14/09

Table 1.1 Results of the Analysis for 4-Methylcyclohexane Methanol in Water
WA# SERAS-001 MCHM Ohio River

Method SERAS SOP# 1857

SERAS Laboratory Number	1400006-BLK1		R401006-01		R401006-02		R401006-03	
Sample Number	WBLK011914		Site 1 Vertical 1		Site 1 Vertical 2		Site 1 Vertical 3	
Sample Location	-		Ohio River\Site 1		Ohio River\Site 1		Ohio River\Site 1	
Dilution Factor	10		10		10		10	
Analyte	Result µg/L	RL µg/L	Result µg/L	RL µg/L	Result µg/L	RL µg/L	Result µg/L	RL µg/L
4-Methylcyclohexane Methanol (cis & trans)	U	0.50	0.66	0.50	0.37 J	0.56	0.64	0.50

Table 1.1 (cont.) Results of the Analysis for 4-Methylcyclohexane Methanol in Water
WA# SERAS-001 MCHM Ohio River

Method SERAS SOP 1857

SERAS Laboratory Number	R401006-04		R401006-05		R401006-06		R401006-07	
Sample Number	Site 2 Vertical 1		Site 2 Vertical 2		Site 2 Vertical 3		Site 3 Vertical 1	
Sample Location	Ohio River\Site 2		Ohio River\Site 2		Ohio River\Site 2		Ohio River\Site 3	
Dilution Factor	10		10		10		10	
Analyte	Result µg/L	RL µg/L	Result µg/L	RL µg/L	Result µg/L	RL µg/L	Result µg/L	RL µg/L
4-Methylcyclohexane Methanol (cis & trans)	0.62	0.53	0.46 J	0.56	0.57	0.56	0.48 J	0.54

Table 1.1 (cont.) Results of the Analysis for 4-Methylcyclohexane Methanol in Water
WA# SERAS-001 MCHM Ohio River

Method SERAS SOP 1857

SERAS Laboratory Number	R401006-08		R401006-09		R401006-10		R401006-11	
Sample Number	Site 3 Vertical 2		Site 3 Vertical 3		Site 4 Vertical 1		Site 4 Vertical 2	
Sample Location	Ohio River\Site 3		Ohio River\Site 3		Ohio River\Site 4		Ohio River\Site 4	
Dilution Factor	10		10		10		10	
Analyte	Result µg/L	RL µg/L	Result µg/L	RL µg/L	Result µg/L	RL µg/L	Result µg/L	RL µg/L
4-Methylcyclohexane Methanol (cis & trans)	0.45 J	0.53	0.56	0.50	0.32 J	0.55	0.31 J	0.50

Table 1.1 (cont.) Results of the Analysis for 4-Methylcyclohexane Methanol in Water
WA# SERAS-001 MCHM Ohio River

Method SERAS SOP 1857

SERAS Laboratory Number	R401006-12	
Sample Number	Site 4 Vertical 3	
Sample Location	Ohio River\Site 4	
Dilution Factor	10	
Analyte	Result µg/L	RL µg/L
4-Methylcyclohexane Methanol (cis & trans)	0.42 J	0.50

Table 2.1 Results of the LCS/LCSD Analysis for 4-Methylcyclohexane Methanol in Water
WA# SERAS-001 MCHM Ohio River

Sample ID: LCS 01/19/14

Analyte	LCS/LCSD Spike Added µg/L	LCS Conc. µg/L	LCS % Recovery	LCSD Conc. µg/L	LCSD % Recovery	RPD	QC Limits RPD	QC Limits % Recovery
4-Methylcyclohexane Methanol (cis & trans)	200	127	63	129	65	2	20	50 - 150

SERAS, Edison, NJ
(732) 321-4200
EPA Contract: EP-W-09-031

CHAIN OF CUSTODY RECORD

Project Name: MCHM OHIO RIVER
Project Number: 103DX9017.0001.0210.0001
LM Contact: Art Smith Phone: 502-905-7559
John Gilbert 513-687-1571

No: 06801
Sheet 01 of 01 (Do not copy)
(for addnl. samples use new form)

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Sample Identification

Analyses Requested WO#R401006

REAC#	Sample No	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	MCHM				
	Site 1 Vertical 1	Ohio River \ Site 1	SW	1/17/14	1	ICE	X				01
	Site 1 Vertical 2										02
	Site 1 Vertical 3										03
	Site 2 Vertical 1	Ohio River \ Site 2									04
	Site 2 Vertical 2										05
	Site 2 Vertical 3										06
	Site 3 Vertical 1	Ohio River \ Site 3									07
	Site 3 Vertical 2										08
	Site 3 Vertical 3										09
	Site 4 Vertical 1	Ohio River \ Site 4									10
	Site 4 Vertical 2										11
	Site 4 Vertical 3										12

Matrix:

A- Air
AT-Animal Tissue
DL- Drum Liquids
DS- Drum Solids
GW- Groundwater
O- Oil
PR-Product
PT-Plant Tissue
PW- Potable Water
S- Soil
SD- Sediment
SL- Sludge
SW- Surface Water
TX-TCLP Extract
W- Water
X- Other

Special Instructions:

Cooler Temp. 2°C GA.

SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #:

Samples to Tetratech [signature] 1/17/14

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished by	Date	Received by	Date	Time
Samples to FedEX	[signature]	1/17/14	Girma Admitie	1-18-14	12:00	All/Analysis	Girma Admitie	1-18-14	[signature]	1/18/14	14:50

SERAS-001-DAR-012314

USGS
science for a changing world

U.S. Department of the Interior
U.S. GEOLOGICAL SURVEY
Kentucky Water Science Center
9818 Bluegrass Parkway
Louisville, KY 40299

Chain-of-Custody Record

Attachment 1

Study No	Study Name MC HM OHIO RIVER ELK RIVER CHEMICAL SPILL	Control No
Samplers: (Signatures)		page ___ of ___

Sample Identification	Date	Time	Type *	Remarks and Observations
Amber glass bottle.	1/17/14	1305		SITE 1, VERTICAL 1
	1/17/14	1341		S1, V2
	1/17/14	1350		S1, V3
	1/17/14	1410		S2, V1
	1/17/14	1430		S2, V2
	1/17/14	1440		S2, V3
	1/17/14	1510		S3, V1
	1/17/14	1520		S3, V2
	1/17/14	1530		S3, V3
	1/17/14	1615		S4, ~~V4~~ V1
	1/17/14	1600		S4, V2
	1/17/14	1555		S4, V3

Relinquished by: (Signature)	Date Time	Received by: (Signature)	Relinquished by: (Signature)	Date Time	Received by: (Signature)
	1/17/14 1700			1/17/14 1800	
Relinquished by: (Signature)	Date Time	Received by: (Signature)	Relinquished by: (Signature)	Date Time	Received by: (Signature)

Relinquished by: (Signature)	Date Time	Received for Laboratory by: (Signature)	Date Time	Remarks

* W=water, S=sediment, P=plant, F=fish, B=benthos, O=other, define in remarks

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